

REMARKS

Summary of the Office Action

Claims 2-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,181,569 to Chakravorty in view of U.S. Patent No. 6,291,897 to Wark et al. ("Wark").

Summary of the Response to the Office Action

Applicants have amended claim 2.

Claims 2-20 are pending, of which claims 11-20 are withdrawn from consideration.

All Claims Define Allowable Subject Matter

Claims 2-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Chakravorty in view of Wark. Applicants respectfully traverse the rejection under 35 U.S.C. § 103(a), of claims 2-10. Applicants have amended claim 2 to particularly point out and distinctly claim Applicants' invention. Claim 2 recites a semiconductor package, including a semiconductor substrate, a plurality of chip pads, a first metal pattern formed on an upper surface of respective chip pads, a second metal pattern formed on an upper surface of the first metal pattern, and an external terminal. The second metal pattern includes a plurality of bulkheads separately formed on the first metal pattern, wherein a width of the bulkhead is uniform regardless of a height of the bulkhead. The external terminal is electrically connected to an upper surface of the second metal pattern and a side portion of the bulkhead, and extends into a space between the plurality of bulkheads. Thus the second metal pattern is composed of a

plurality of bulkheads exposing the first metal pattern, wherein the width of each bulkhead is uniform regardless of a height of the bulkhead, and a solder ball may be electrically connected to the chip pad through the first and second metal patterns. Therefore, Applicants' invention provides a semiconductor package for enhancing adhesion between a solder ball and a chip pad. Support for these features is provided at, for example, Figs. 3F-3J, of Applicants' specification as originally filed.

In contrast, as shown in Fig. 8C of Chakravorty, a one-piece cup-shaped under bump metalization 310 is formed on trace 307. Bump 313 is electrically connected to the cup-shaped under bump metalization 310. Thus, Applicants submit that Chakravorty does not teach or suggest at least the features of a second metal pattern having a plurality of bulkheads separately formed on a first metal pattern, as recited in claim 2. Nor does Chakravorty teach or suggest an external terminal electrically connected to an upper surface of the second metal pattern and a side portion of the bulkhead, and extending into a space between the plurality of bulkheads, as recited in claim 2.

Applicants submit that Wark fails to overcome the above-described deficiencies of Chakravorty. As shown in Fig. 1A and 1B, and described at col. 7, ll. 25-38 of Wark, projections 24 are pyramidal in shape, having an upper portion that is narrower than a lower portion. The projections 24 allegedly provide a contact structure that can engage a solder ball 12 without substantially detrimentally deforming the solder ball 12. The projections 24 pierce or engage the outer surface 30 of the solder ball 12. Because the projections 24 engage the solder ball 12 along thin, knife-like contact edges, the shape envelope of solder ball 12 is substantially

maintained as the relatively higher force per unit area results in deeper but cleaner penetration, "slicing" rather than "pushing" into the solder ball 12, thus minimizing deformation of the "envelope" of the solder ball. Thus, Applicants submit that Wark does not teach or suggest at least the features of a second metal pattern having a plurality of bulkheads separately formed on a first metal pattern, wherein a width of the bulkhead is uniform regardless of a height of the bulkhead, as recited in claim 2.

Accordingly, Applicants submit that claim 2 is patentable. Claims 3-10 ultimately depend from claim 2, and recite the same combination of allowable features recited in claim 2, as well as additional features that define over the prior art. Applicants respectfully request that the rejection under 35 U.S.C. § 103(a), of claims 2-10, be withdrawn, and the claims allowed.

CONCLUSION

In view of the foregoing, Applicants respectfully request reconsideration and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

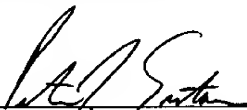
If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully Submitted,

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